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| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
|-----------------|-------------|----------------------|---------------------|------------------|
| 08/872,659      | 06/10/1997  | SANDOR NAGY          | 016199/1110         | 9801             |

7590 02/26/2003

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[REDACTED] EXAMINER

RABAGO, ROBERTO

[REDACTED] ART UNIT

[REDACTED] PAPER NUMBER

1713

DATE MAILED: 02/26/2003

26

Please find below and/or attached an Office communication concerning this application or proceeding.

|                              |                 |              |  |
|------------------------------|-----------------|--------------|--|
| <b>Office Action Summary</b> | Application No. | Applicant(s) |  |
|                              | 08/872,659      | NAGY ET AL.  |  |
| Examiner                     | Art Unit        |              |  |
| Rob Rábago                   | 1713            |              |  |

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

#### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

#### Status

- 1) Responsive to communication(s) filed on \_\_\_\_\_.
- 2a) This action is FINAL.                    2b) This action is non-final.
- 3) Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

#### Disposition of Claims

- 4) Claim(s) 22-35,37-51 and 53-73 is/are pending in the application.
  - 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) Claim(s) \_\_\_\_\_ is/are allowed.
- 6) Claim(s) 22-35,37-51 and 53-73 is/are rejected.
- 7) Claim(s) \_\_\_\_\_ is/are objected to.
- 8) Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

#### Application Papers

- 9) The specification is objected to by the Examiner.
- 10) The drawing(s) filed on \_\_\_\_\_ is/are: a) accepted or b) objected to by the Examiner.
 

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) The proposed drawing correction filed on \_\_\_\_\_ is: a) approved b) disapproved by the Examiner.
 

If approved, corrected drawings are required in reply to this Office action.
- 12) The oath or declaration is objected to by the Examiner.

#### Priority under 35 U.S.C. §§ 119 and 120

- 13) Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
  - a) All
  - b) Some \*
  - c) None of:
    1. Certified copies of the priority documents have been received.
    2. Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
    3. Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.
- 14) Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
  - a) The translation of the foreign language provisional application has been received.
- 15) Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

#### Attachment(s)

- |  |   |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892)                             | 4) <input type="checkbox"/> Interview Summary (PTO-413) Paper No(s). _____  |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)         | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ | 6) <input type="checkbox"/> Other: _____                                    |

## DETAILED ACTION

1. Pursuant to the reversal and remand by the Board of Patent Appeals and Interferences mailed January 27, 2003, prosecution in this application is reopened. In view of the fact that the content of the Board decision has a direct bearing on further prosecution in this application, a brief discussion thereof is in order.

The issues in the appeal were stated by appellants at page 3, section VI of the Brief filed October 16, 2000, and verified by the examiner in the Answer at page 2, section (6). In response to these stated issues, the Decision is silent. Although the Decision states at page 4, lines 7-8: "We have carefully considered all of the arguments advanced by the appellants and the examiner ...", there is no acknowledgement, discussion or decision regarding any of the aforementioned stated issues. The Board has left unresolved all of the issues upon which appeal was sought by applicants.

Regarding the prior rejection under 35 USC 103(a) over the Reichle reference, the examiner has been reversed for reasons unrelated to the stated issues set forth in either the Brief or the Answer. The Decision has dismissed the rejection as "oversimplified", but contains no acknowledgement or discussion of the specific arguments, reference citations of supporting disclosure, or analysis set forth as a basis for the prior rejection. The Decision then goes on to remand the application to the examiner for consideration of a rejection under 103(a) over the same reference and the same grounds as contained in the rejection set forth in the appeal. The following

statement from the Decision at page 5, line 18 through page 6, line 3 is particularly noteworthy:

The issue to be considered is whether that portion of the claimed subject matter not described in the parent application, i.e., Nagy '660 is anticipated by or rendered obvious over the teachings and suggestions of the intervening reference to Reichle.

It is precisely this issue, i.e., the availability of the intervening reference to Reichle as available prior art in view of the scope of disclosure in the parent application, which was identified and argued in both the Brief and the Answer. See Answer at page 4, lines 11-16:

Therefore, the instant claims are entitled to the filing date of the CIP parent only with respect to subject matter which was disclosed in the parent. Accordingly, REICHLE qualifies as prior art for the subject matter of the instant claims which was not disclosed in Nagy I. As none of the current claims are limited to subject matter which was either fully supported by the parent disclosure or not suggested in REICHLE, all of the claims are properly rejected under 35 USC 103 as obvious over REICHLE.

Furthermore, the disclosure cited in the remand as evidence of a prima facie case of obviousness (see decision at page 6, line 13 through page 7, line 12) is squarely within the disclosure identified in the Answer in support of obviousness (see Answer at page 3, line 18 through page 4, line 4). Therefore, it would appear that the Board's only displeasure with the rejection as set forth in the Answer was that two of the subgeneric groups identified in their "findings" (i.e., subgeneric groups R' and X, see decision at page 6, lines 13-17 and page 7, lines 6-12) were not specifically addressed in the Answer. It should be noted that the issue regarding scope of M discussed in the Decision at page 7, lines 1-5, was addressed in the Answer at page 6, lines 11-18, although the Decision provided no acknowledgement of this discussion. Accordingly,

the rejection as set forth below has the same basis as the previously appealed rejection, but now with the additional mention of subgeneric groups R' and X which the Board has identified.

Finally, the remand at page 6, lines 18 through page 7, line 1, includes an implication that the limitation "[w]here M is a Group 3 to 10 metal," should either be objected to or rejected under 35 USC 112, second paragraph, supported by the statement at page 6, lines 20-21 that "the Periodic Table of the Elements generally contains only 8 groups". The Board's statement is factually incorrect. The International Union of Pure and Applied Chemistry (IUPAC) approved new numbering of the Periodic Table in the 1980's in an effort to eliminate confusion regarding the IA-VIIIA and IB-VIIB designations, wherein the periodic groups are now labeled 1-18 straight across. This fact would be readily understood by anyone of ordinary skill in this art, and therefore no lack of clarity exists with respect to the claim language regarding periodic groups.

Attached are the inside cover flaps from Chemistry, an undergraduate chemistry textbook published in 1987, and Hawley's Condensed Chemical Dictionary, published in 1997.

### ***Claim Objections***

2. Claim 73 is objected to because an apparently incorrect period occurs after "M" in the third line from the end.

***Claim Rejections - 35 USC § 112***

3. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

4. Claim 73 is rejected under 35 U.S.C. 112, first paragraph, as containing subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention. In the Examiner's Answer mailed 1/21/2001, applicants were advised that in claim 73 (added in the amendment filed 9/17/1999), the clause following the period after "M" was not considered to be part of the claim because it occurred outside the bounds of the claim. Applicants then argued in their Reply Brief that the first period was an inadvertent mistake, and that the clause beginning "with the proviso ..." was part of the claim. As such, the three species recited are deemed to be new matter because no specific mention thereof can be found in the specification as filed.

***Claim Rejections - 35 USC § 103***

5. Claims 22-35, 37-51, and 53-73 are rejected under 35 U.S.C. 103(a) as being unpatentable over Reichle et al. (US 5,852,146).

The reference discloses organometallic compounds used as catalysts for the polymerization of olefins (col. 1-3), a substantial portion of which are within the scope of

the instant claims, and further comprising an aluminoxane or borate-based cocatalyst (col. 4-5). The disclosed catalysts are recommended for use in conventional processes of polymerization (col. 5, line 37 through col. 6, line 61). The genus of organometallic compounds of the instant claims is substantially coextensive with the reference genus of unbridged ligand structures, and one of ordinary skill in the art would be motivated to use the full scope of the unbridged compounds for olefin polymerization as taught in Reichle because patentee has suggested that a useful polymerization process would result, with reasonable success expected.

A comment regarding the examples from Reichle is in order. Absent applicants' parent application (hereinafter Nagy I), the reference would have been applied under 35 USC 102(e) because the examples show embodiments within the claimed scope. However, as these same embodiments were disclosed in Nagy I, it would appear that applicants have established priority to those species. The filing date of Reichle predates that of the instant CIP application (hereinafter Nagy II), and that of Nagy I predates Reichle. Therefore, the instant claims are entitled to the filing date of the CIP parent application only with respect to subject matter which was disclosed in the parent. Accordingly, Reichle qualifies as prior art for the subject matter of the instant claims which was not disclosed in Nagy I. As none of the current claims are limited to subject matter which was either fully supported by the parent disclosure or not suggested in Reichle, all of the claims are properly rejected under 35 USC 103 as obvious over Reichle.

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Prior to identification of the specific subgeneric set of catalyst structures which forms the basis of the *prima facie* case of obviousness, a comparison of the three disclosures regarding the essential catalyst substituents is in order.

Core unbridged pyridinoxy or quinolinoxy ligand:

Nagy I discloses these at col. 2-3, when bridging unit Y is O (oxygen).

Reichle discloses these as structures (I) and (II) when n=0 (col. 1-2).

Nagy II claims these in independent claims 71-73, when bridging unit Y is O.

Transition metal M:

Nagy I discloses zirconium, titanium and hafnium (col. 2, line 36-37).

Reichle discloses group IIIB - VIII transition metals and lanthanides (col. 2, lines 24-25). Reichle has used outdated periodic group designations, and groups IIIB – VIII correspond to groups 3-10 as described in Nagy II.

Nagy II claims groups 3-10 in independent claims 71-73.

Ligand group X:

Nagy I discloses halogen, C<sub>1</sub>-C<sub>6</sub> alkyl, C<sub>1</sub>-C<sub>6</sub> alkoxy and -NR<sub>2</sub>, wherein R is C<sub>1</sub>-C<sub>6</sub> alkyl (col. 2, lines 37-44).

Reichle discloses hydrogen, aryl, alkyl, alkenyl, alkylaryl, arylalkyl, C<sub>1</sub>-C<sub>20</sub> hydrocarboxy, -NR<sub>2</sub>, -OR, -RCO (wherein R is C<sub>1</sub>-C<sub>20</sub> hydrocarbyl) and halogen (col. 3, lines 24-29).

Nagy II claims halogen, C<sub>1</sub>-C<sub>6</sub> alkyl, C<sub>6</sub>-C<sub>14</sub> aryl, C<sub>7</sub>-C<sub>20</sub> alkaryl, C<sub>7</sub>-C<sub>20</sub> aralkyl, C<sub>1</sub>-C<sub>6</sub> alkoxy, and NR<sub>2</sub> in independent claims 71-73.

Substituent groups R' (Nagy) and R<sup>1-4</sup> (Reichle):

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Nagy I discloses hydrogen, C<sub>1</sub>-C<sub>6</sub> alkyl, C<sub>6</sub>-C<sub>16</sub> aryl, C<sub>1</sub>-C<sub>6</sub> alkoxy, halogen, or CF<sub>3</sub> (col. 2, lines 34-36).

Reichle discloses C<sub>1</sub>-C<sub>20</sub> hydrocarbon (col. 31-34).

Nagy II claims hydrogen, C<sub>1</sub>-C<sub>6</sub> alkyl, C<sub>6</sub>-C<sub>14</sub> aryl, C<sub>1</sub>-C<sub>6</sub> alkoxy, halogen, C<sub>7</sub>-C<sub>20</sub> aralkyl, or CF<sub>3</sub> in independent claims 71-73.

As seen from the comparison above, the scope of catalyst substructures disclosed in Reichle and claimed in Nagy II are substantially coextensive, with the disclosure of Nagy I being significantly narrower. To obtain a group of catalysts structures which have been disclosed in Reichle, claimed in Nagy II, but not disclosed in Nagy I, it would be necessary to select from Reichle either a pyridinoxy or quinolinoxy ligand wherein n=0 (i.e., no bridge), and at least one of the following: (a) M comprising a group 3 or group 5-10 transition metal, (b) X comprising C<sub>6</sub>-C<sub>14</sub> aryl, C<sub>7</sub>-C<sub>20</sub> alkaryl or C<sub>7</sub>-C<sub>20</sub> aralkyl, or (c) any one of R<sup>1-4</sup> comprising C<sub>7</sub>-C<sub>20</sub> aralkyl. One of ordinary skill in the art would be motivated to select an unbridged pyridinoxy or quinolinoxy ligand with at least one of the subgroups (a) – (c) because Reichle has suggested that useful catalyst structures would result. Since the genus of catalysts which have been disclosed in Reichle, claimed in Nagy II, but not disclosed in Nagy I is a large percentage of the catalysts disclosed in Reichle, a *prima facie* case of obviousness exists.

6. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Rob Rábago whose telephone number is (703) 308-

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4347. The examiner can normally be reached on Monday - Friday from 7:30 am - 3:00 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, David Wu can be reached at (703) 308-2450. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 872-9310 for regular communications and (703) 872-9311 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0661.

Rob Rábago  
Examiner  
Art Unit 1713

RR *RB*  
February 25, 2003

*DW*  
DAVID W. WU  
SUPERVISORY PATENT EXAMINER  
TECHNOLOGY CENTER 1700

|   | Atomic number |
|---|---------------|
| H | 1.008         |

IC number

|       |       |       |       |       |       |       |       |       |       |       |       |       |       |
|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| 58    | 59    | 60    | 61    | 62    | 63    | 64    | 65    | 66    | 67    | 68    | 69    | 70    | 71    |
| Ce    | Pr    | Nd    | Pm    | Sm    | Eu    | Gd    | Tb    | Dy    | Ho    | Er    | Tm    | Yb    | Lu    |
| 140.1 | 140.9 | 144.2 | (147) | 150.4 | 152.0 | 157.3 | 158.9 | 162.5 | 164.9 | 167.3 | 168.9 | 173.0 | 175.0 |
| 90    | 91    | 92    | 93    | 94    | 95    | 96    | 97    | 98    | 99    | 100   | 101   | 102   | 103   |
| Th    | Pa    | U     | Np    | Pu    | Am    | Cm    | Bk    | Cf    | Es    | Fm    | Md    | No    | Lr    |
| 232.0 | (231) | 238.0 | (237) | (242) | (243) | (247) | (247) | (249) | (254) | (253) | (256) | (254) | (257) |

The I-18 group designation has been recommended by the International Union of Pure and Applied Chemistry (IUPAC) but is not yet in wide use. In this text we use the standard-U.S. notation for group numbers (IA-8A and 1B-8B).

# Periodic table of the elements

18

|                        |              |           |           |                |
|------------------------|--------------|-----------|-----------|----------------|
| <b>1</b>               | <b>Group</b> | <b>1</b>  | <b>2</b>  | <b>18</b>      |
| <b>H</b>               | <b>IA</b>    | <b>13</b> | <b>14</b> | <b>15</b>      |
| <b>Li</b>              | <b>IIA</b>   | <b>16</b> | <b>17</b> | <b>VIIA</b>    |
| <b>Be</b>              | <b>IIIB</b>  | <b>18</b> | <b>19</b> | <b>He</b>      |
| <b>Na</b>              | <b>IVB</b>   | <b>20</b> | <b>21</b> | <b>Ne</b>      |
| <b>Mg</b>              | <b>VIB</b>   | <b>22</b> | <b>23</b> | <b>20.179</b>  |
| <b>K</b>               | <b>VIA</b>   | <b>24</b> | <b>25</b> | <b>4.00260</b> |
| <b>Ca</b>              | <b>VIB</b>   | <b>26</b> | <b>27</b> |                |
| <b>Sc</b>              | <b>VIB</b>   | <b>28</b> | <b>29</b> |                |
| <b>Ti</b>              | <b>VIB</b>   | <b>30</b> | <b>31</b> |                |
| <b>Cr</b>              | <b>VIB</b>   | <b>32</b> | <b>33</b> |                |
| <b>Mn</b>              | <b>VIB</b>   | <b>34</b> | <b>35</b> |                |
| <b>Fe</b>              | <b>VIB</b>   | <b>36</b> | <b>37</b> |                |
| <b>Co</b>              | <b>VIB</b>   | <b>38</b> | <b>39</b> |                |
| <b>Ni</b>              | <b>VIB</b>   | <b>40</b> | <b>41</b> |                |
| <b>Cu</b>              | <b>VIB</b>   | <b>42</b> | <b>43</b> |                |
| <b>Zn</b>              | <b>VIB</b>   | <b>44</b> | <b>45</b> |                |
| <b>Ga</b>              | <b>VIB</b>   | <b>46</b> | <b>47</b> |                |
| <b>Ge</b>              | <b>VIB</b>   | <b>48</b> | <b>49</b> |                |
| <b>As</b>              | <b>VIB</b>   | <b>50</b> | <b>51</b> |                |
| <b>Se</b>              | <b>VIB</b>   | <b>52</b> | <b>53</b> |                |
| <b>Br</b>              | <b>VIB</b>   | <b>54</b> | <b>Xe</b> |                |
| <b>Kr</b>              | <b>VIB</b>   |           |           |                |
| <b>Rb</b>              | <b>III A</b> | <b>13</b> | <b>14</b> |                |
| <b>Sr</b>              | <b>III A</b> | <b>15</b> | <b>16</b> |                |
| <b>Y</b>               | <b>III A</b> | <b>17</b> | <b>18</b> |                |
| <b>Zr</b>              | <b>III A</b> | <b>19</b> | <b>20</b> |                |
| <b>Nb</b>              | <b>III A</b> | <b>21</b> | <b>22</b> |                |
| <b>Mo</b>              | <b>III A</b> | <b>23</b> | <b>24</b> |                |
| <b>Tc</b>              | <b>III A</b> | <b>25</b> | <b>26</b> |                |
| <b>Ru</b>              | <b>III A</b> | <b>27</b> | <b>28</b> |                |
| <b>Rh</b>              | <b>III A</b> | <b>29</b> | <b>30</b> |                |
| <b>Pd</b>              | <b>III A</b> | <b>31</b> | <b>32</b> |                |
| <b>Ag</b>              | <b>III A</b> | <b>33</b> | <b>34</b> |                |
| <b>Cd</b>              | <b>III A</b> | <b>35</b> | <b>36</b> |                |
| <b>In</b>              | <b>III A</b> | <b>37</b> | <b>38</b> |                |
| <b>Sn</b>              | <b>III A</b> | <b>39</b> | <b>40</b> |                |
| <b>Sb</b>              | <b>III A</b> | <b>41</b> | <b>42</b> |                |
| <b>Te</b>              | <b>III A</b> | <b>43</b> | <b>44</b> |                |
| <b>I</b>               | <b>III A</b> | <b>45</b> | <b>46</b> |                |
| <b>F</b>               | <b>IV A</b>  | <b>47</b> | <b>48</b> |                |
| <b>Ra</b>              | <b>IV A</b>  | <b>49</b> | <b>50</b> |                |
| <b>Ac</b>              | <b>IV A</b>  | <b>51</b> | <b>52</b> |                |
| <b>Unq<sup>a</sup></b> | <b>IV A</b>  | <b>53</b> | <b>54</b> |                |
| <b>Unp<sup>a</sup></b> | <b>IV A</b>  | <b>55</b> | <b>56</b> |                |
| <b>Unh<sup>a</sup></b> | <b>IV A</b>  | <b>57</b> | <b>58</b> |                |
| <b>Uhs<sup>a</sup></b> | <b>IV A</b>  | <b>59</b> | <b>60</b> |                |
|                        |              | <b>61</b> | <b>62</b> |                |
|                        |              | <b>63</b> | <b>64</b> |                |
|                        |              | <b>65</b> | <b>66</b> |                |
|                        |              | <b>67</b> | <b>68</b> |                |
|                        |              | <b>69</b> | <b>70</b> |                |
|                        |              | <b>71</b> | <b>Lu</b> |                |

New notation  
Previous IUPAC form  
CAS version

**★ Lanthanide series**

|           |           |           |           |           |           |           |           |           |           |           |           |           |           |           |           |           |           |           |           |           |           |           |           |           |           |           |           |
|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
| <b>58</b> | <b>Ce</b> | <b>59</b> | <b>Pr</b> | <b>60</b> | <b>Nd</b> | <b>61</b> | <b>Pm</b> | <b>62</b> | <b>Sm</b> | <b>63</b> | <b>Eu</b> | <b>64</b> | <b>Gd</b> | <b>65</b> | <b>Tb</b> | <b>66</b> | <b>Dy</b> | <b>67</b> | <b>Ho</b> | <b>68</b> | <b>Er</b> | <b>69</b> | <b>Tm</b> | <b>70</b> | <b>Yb</b> | <b>71</b> | <b>Lu</b> |
| 140.12    | 140.908   | 144.24    | (145)     | 150.36    | 151.956   | 157.25    | 158.925   | 162.50    | 164.930   | 167.26    | 168.934   | 173.04    | 174.967   |           |           |           |           |           |           |           |           |           |           |           |           |           |           |

**▲ Actinide series**

|           |           |           |           |           |          |           |           |           |           |           |           |           |           |           |           |           |           |           |           |            |           |            |           |            |           |
|-----------|-----------|-----------|-----------|-----------|----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|------------|-----------|------------|-----------|------------|-----------|
| <b>90</b> | <b>Th</b> | <b>91</b> | <b>Pa</b> | <b>92</b> | <b>U</b> | <b>93</b> | <b>Pu</b> | <b>94</b> | <b>Am</b> | <b>95</b> | <b>Cm</b> | <b>96</b> | <b>Bk</b> | <b>97</b> | <b>Cf</b> | <b>98</b> | <b>Es</b> | <b>99</b> | <b>Fm</b> | <b>100</b> | <b>Md</b> | <b>101</b> | <b>No</b> | <b>102</b> | <b>Rn</b> |
| 232.038   | 231.036   | 238.029   | 237.048   | (244)     | (243)    | (247)     | (247)     | (251)     | (251)     | (257)     | (257)     | (258)     | (259)     | (260)     |           |           |           |           |           |            |           |            |           |            |           |

Note: Atomic masses shown here are the 1991 IUPAC values (maximum of six significant figures). <sup>a</sup> Symbols based on IUPAC systematic names.